

# Inherited vs self-made wealth: Theory & evidence from a rentier society (Paris 1872–1927)☆

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## Abstract

We divide decedents into two groups: “rentiers” (whose wealth is smaller than the capitalized value of their inherited wealth) and “savers” (who consumed less than their labor income). Applying this split to a unique micro data set on inheritance and matrimonial property regimes, we find that Paris from 1872 to 1927 was a “rentier society”. Rentiers made up about 10% of the population of Parisians but owned 70% of aggregate wealth. Rentier societies thrive when the rate of return on private wealth  $r$  is larger than the growth rate  $g$  (say,  $r = 4\%$  vs  $g = 2\%$ ). This was the case in the 19th and early 20th centuries and is likely to happen again in the 21st century. At the time, top successors’ capital income sustains living standards far beyond what labor income alone would permit.

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## 1. Introduction

The relative importance of inherited versus self-made wealth is a controversial topic in social science. Beyond academia, modern societies (France included) often extol

the opportunities they offer for upward social mobility. As such, political discourse celebrates hard work and high savings over inheritance or luck as paths to material well-being and wealth. Positive references to social mobility are so commonplace that such mobility is often accepted as a fact (rather than a goal). Yet, we know very little about the relative importance of inherited wealth and self-made wealth.

This paper starts with the traditional definition of an individual’s inherited wealth as the capitalized value of the wealth he or she inherited. From there we define two groups. The first are “inheritors” (rentiers): their assets are smaller than the capitalized value of the wealth they inherited (they consumed more than their labor income). The second group comprises “savers” (self-made individuals): their assets are greater than the

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capitalized value of the wealth they inherited (they saved part of their labor income). We apply these definitions to an extraordinarily rich data set we collected from individual estate tax records in Paris between 1872 and 1927.

In each year, inheritors made up about 10% of Parisians and owned about 70% of the wealth. Inherited wealth was as large as 80% of aggregate wealth. More importantly, rentiers are an ever increasing share of the population in higher fractiles. They made up only a quarter of the middle class (wealth fractile P50–90). They accounted for half of the “middle rich” (P90–99), and over 70% of the “very rich” (P99–100). This does not mean that there were no savers. Even the wealthiest fractile contains about a quarter of individuals who inherited little wealth and made their way to the top. But they were a minority. The other remarkable pattern is that this very high share was quite stable from 1872 to the Great Depression. In fact, Paris between 1872 and 1927 was the quintessence of a rentier society. That is, a society dominated by individuals who received and left large bequests. Moreover, spending part of the return to their inherited wealth allowed them lifestyles far beyond what labor income and individual merit alone would have permitted. Paris at this time looked more like a “city of rentiers” than a “city of opportunity.”

To our knowledge, we are the first to carry out this simple breakdown between inheritors and savers. However, exploratory computations suggest that today’s rentiers’ shares in population and wealth are probably only somewhat lower than in Paris from 1872 to 1927. Indeed, wealth concentration in developed societies has fallen less than some observers tend to imagine. When we compare the wealth distributions prevailing in France around 1910 to today’s France and United States, it is clear that France on the eve of WWI was very unequal. The top 10% of the population, which one might call the “upper class,” owned over 85% of the wealth. The past century has seen the growth of a middle class, both in France or the United States. Yet one should not overstate the quantitative importance of these historical changes. Even today, the middle class wealth share in the United States is only 26%; the upper class wealth share is 72%, less than the 87% observed in 1910 France but still huge. And much of that wealth is likely to be bequeathed at death. In Paris, our laboratory, wealth concentration was even more extreme: the top 10% wealth share was over 95% in Paris in 1912, and the top 1% share above 60%. The wealth shares of the bottom 50% (the “poor”) and the middle 40% (the “middle class”) were close to 0%. Basically there was no middle class.

More generally, although the economy of Paris between 1872 and 1927 was quite different from contemporary economies, the mechanics of inequality have not

changed. They involve, among other things, life expectancy, returns to investment, savings decisions, and tax policy. Wealth accumulation is always associated with significant inequality and it involves different groups of agents with distinct wealth trajectories. Such a process simply cannot be properly understood and analyzed within a representative agent framework.

Finally, the relative importance of inherited wealth is growing, pushing far beyond the low levels seen from 1945 to 1980. That period probably has had too much influence on modern economic thinking, because it featured unusually strong ties between the lifecycle and wealth accumulation. In fact, in the next few decades inherited wealth is likely to reach a level close to what it had been in Paris between 1872 and 1927. As one of us has recently shown for France, the aggregate inheritance flow shows a very marked U-shape over the past century (see [Piketty, 2011](#)). The pattern comes partly from the evolution of the private wealth-income ratio. This ratio was unusually low in the 1950s, due to war losses, and low real estate and stock prices and then kept down by the slow pace of age-wealth profiles’ return to their steep pre-WWI slopes. The key mechanism driving aggregate inheritance’s rebound to its former high levels is simple: the rate of return on private wealth  $r$  (3 to 5%) is larger than the rate of growth of the economy  $g$  (1% to 2%). As long as  $r > g$ , past wealth and inheritance are bound to play a key role in current wealth. Before WWI and since 1990  $r$  has been roughly twice  $g$ . As we shall see here, this “ $r > g$ ” logic matters both at the aggregate level and for the micro structure of lifetime inequality. It is critical to the emergence and endurance of rentier societies.

This research is related to several literatures. First, it continues the work begun in [Piketty et al. \(2006\)](#). There, we focused on the long-run evolution of cross-sectional wealth concentration in France. Here, we rely on details of marriage law to relate each decedent’s wealth to the bequests and gifts he or she had received while alive. On a second level, it seeks to move the analysis of long-run trends in income and wealth inequality pioneered by [Kuznets \(1953\)](#), and recently revived by [Atkinson and Piketty \(2007, 2010\)](#) and [Atkinson et al. \(2011\)](#), away from its heavy reliance on published aggregate data towards more micro based sources. While published data have allowed scholars to describe the evolution of income or wealth inequality in more than two dozen countries, they are of little help for explaining that evolution.

More directly, our methodological innovation and our estimates relate to the literature on intergenerational transfers and wealth accumulation as well as to debates over the extent of life cycle versus dynastic savings in aggregate wealth. As we discuss further below, we were

inspired by the debate between Kotlikoff (1988, 1981) and Modigliani (1986, 1988) over the share of inherited wealth in total wealth. Finally, our work is also related to the recent literature attempting to introduce wealth heterogeneity into calibrated general equilibrium macro models (see Cagetti and De Nardi (2008) for a recent survey). One limitation of this literature is that inheritance parameters tend to be imprecisely calibrated (and are generally underestimated; see Piketty (2011)). Here we develop a particular way to introduce heterogeneity (inheritors vs savers), which we hope will be useful for macro modeling and the welfare analysis of various macro policies. Let us start with this heterogeneity.

## 2. A simple model of “inheritors” vs “savers”

### 2.1. Basic notations and definitions

Consider a population of size  $N_t$  with aggregate private wealth  $W_t$  and national income  $Y_t = Y_{Lt} + r_t W_t$ , where  $Y_{Lt}$  is aggregate labor income, and  $r_t$  is the average rate of return on private wealth. Let  $w_t, Y_{Lt}, Y_t$  be the per capita analogs of  $W_t, Y_{Lt}$ , and  $Y_t$ .

Consider a given individual  $i$  with wealth  $w_{it}$  at time  $t$ ,  $b_{it}^0$  is the bequest she received at time  $t_i < t$ . Let  $b_{it}^* = b_{it}^0 e^{r(t_i,t)}$  be the capitalized value of  $b_{it}^0$  at time  $t$  (where  $r(t_i,t)$  is the cumulated rate of return between time  $t_i$  and time  $t$ ). Rentiers are such that  $b_{it}^* > w_{it}$ . The  $N_t^r$  rentier are  $\rho_t = N_t^r/N_t$  of the population, their average wealth is  $w_{tr} = E(w_{it} | w_{it} < b_{it}^*)$  while their average capitalized bequest is  $b_{tr}^* = E(b_{it}^* | w_{it} < b_{it}^*)$  and finally their share of wealth is  $\pi_t = \rho_t w_{tr}/w_t$ . Savers are such that  $b_{it}^* \leq w_{it}$  and they have similarly defined average variables.

Let  $\varphi_t$  and  $1 - \varphi_t$  be the shares of inherited wealth and self-made wealth in aggregate wealth:

$$\varphi_t = \frac{[\rho_t W_{tr} + (1-\rho_t)b_{ts}^*]}{W_t} = \Pi_t + (1-\rho_t)b_{ts}^*/W_t \quad (2.1)$$

$$1-\varphi_t = \frac{(1-\rho_t)(W_{ts}-b_{ts}^*)}{W_t} = 1-\Pi_t-(1-\rho_t)b_{ts}^*/W_t. \quad (2.2)$$

By definition, inheritors consumed more than their labor income ( $w_{it} < b_{it}^* \leftrightarrow c_{it}^* > y_{Lti}$ ), while savers consumed less than their labor income ( $w_{it} \geq b_{it}^* \leftrightarrow c_{it}^* \leq y_{Lti}$ ). The key point of the model is that we only need wealth ( $w_{it}$ ) and capitalized inheritance ( $b_{it}^*$ ) to determine whether an individual is an inheritor or a saver, and to compute  $\rho_t, \pi_t$  and  $\varphi_t$ .

Our accounting model assumes that one can measure  $\rho_t, \pi_t$ , and  $\varphi_t$  either for the entire living population or for the subpopulation of decedents. We made both computations

(as well as the full age profiles  $\rho_t(a), \pi_t(a)$ , and  $\varphi_t(a)$ ), but because our data come from estates, we focus on the values taken by  $\rho_t, \pi_t$  and  $\varphi_t$  among decedents. The idea of lifetime balance sheets (how much one received in lifetime resources versus how much one consumed) makes most sense at death.

### 2.2. A simple numerical illustration

#### 2.2.1. Individual 1

Oscar de la Vallée died in 1892 (time  $t$ ) aged 71. He left 464,652 francs (65,000 in Parisian real estate; 72,000 in equities; 217,000 in bonds, the rest in movables, bank accounts, and a dowry to a child). Some years before (we assume 1862), he had inherited 207,638 francs from his parents. So  $w_{it} = 464,652$  and  $b_{it}^0 = 207,638$ . With a constant rate of return  $r_t = r$ , capitalized bequest  $b_{it}^*$  is given by:  $b_{it}^* = e^{r(30)} b_{it}^0$

With  $r = 4\%$ , then  $e^{r(a-D)} = 332\%$  and  $b_{it}^* = 689,358 = 207,638$  (capital value) + 481,720 (cumulated return). By our definition Mr. de la Vallée was a “rentier” ( $b_{it}^* = 689,358 > 464,652 = w_{it}$ ). This is irrespective of how Mr. de la Vallée organized his life and his finances, or how he used his 207,638 francs inheritance. The details of his decisions are wholly irrelevant from a welfare perspective. Whatever his consumption and investment choices were, he acquired assets while at the same time consuming more than his labor income. Of course, the rate of return on assets is critical to these computations. With  $r = 3\%$ ,  $e^{r(a-D)} = 246\%$  and  $b_{it}^* = 510,789$ . With  $r = 5\%$ , then  $e^{r(a-D)} = 448\%$  and  $b_{it}^* = 930,218$ . We return to this in the empirical section.

#### 2.2.2. Individual 2

Marie Rivette died aged 59 in 1892. She left 49,162 francs (6611 in equities, 34,400 in bonds, the rest in movables and bank accounts). She had inherited 1767 francs at an unknown date (assume thirty years ago). So  $w_{it} = 49,162$  and  $b_{it} = 1767$ . With  $r = 4\%$ ,  $e^{r(a-D)} = 332\%$  and  $b_{it}^* = 5866$ . So we have  $b_{it}^* < w_{it}$ . Ms. Rivette was a “saver”; over her lifetime she consumed less than her labor income.

#### 2.2.3. Hypothetical economy

One fifth ( $\rho_t$ ) of the population are inheritors like Mr. de la Vallée ( $w_{tr} = 464,652, b_{tr}^* = 689,358$ ) and four fifths ( $1 - \rho_t$ ) are savers like Ms. Rivette ( $w_{ts} = 49,162, b_{ts}^* = 5866$ ). Average wealth is  $w_t = \rho_t w_{tr} + (1 - \rho_t) w_{ts} = 132,260$ , while the average capitalized bequest is  $b_t^* = \rho_t b_{tr}^* + (1 - \rho_t) b_{ts}^* = 142,564$ . The inheritors’ share of wealth  $\pi_t = \rho_t w_{tr}/w_t = 70\%$ , and the share of inherited wealth in wealth is  $\varphi_t = \pi_t + (1 - \rho_t) b_{ts}^*/w_t = 74\%$ . These

numbers are illustrative, but they produce results similar to what we observe today in France and the United States.<sup>1</sup>

### 2.3. Differences with the Kotlikoff–Summers–Modigliani definitions

Modigliani (1986, 1988) defined the inheritance share as the ratio of aggregate un-capitalized bequests received at any time by individuals still alive ( $B_t^0$ ) to aggregate wealth ( $w_t$ ):

$$\varphi_t^M = B_t^0/W_t = b_t^0/w_t \quad (2.3)$$

$b_t^0 = B_t^0/N_t$  = per capita non-capitalized value at time  $t$  of past bequests.

The definition is easy to implement. However, real estate produces rents, equities dividends, and bonds interest, so it understates the value of inherited wealth. As Blinder (1988) argued: “a Rockefeller with zero lifetime labor income and consuming only part of his inherited wealth income would appear to be a life-cycle saver in Modigliani’s definition, which seems weird to me.” If, in our example economy, everybody was a Mr. de la Vallée (i.e. if all wealth comes from inheritance, or  $\varphi_t = 100\%$ ), then the Modigliani definition would put the inheritance share  $\varphi_t^M$  at only 44%, and would attribute 56% of wealth accumulation to life-cycle motives. Kotlikoff and Summers (1981, 1988) attempted to correct this bias. They took the inheritance share as the ratio of capitalized bequests to aggregate wealth:

$$\varphi_t^{KS} = B_t^*/W_t = b_t^*/w_t \quad (2.4)$$

$B_t^*$  is the capitalized value at time  $t$  of past bequests (i.e. all bequests received at any time  $t' < t$  by individuals still alive at time  $t$ ) and  $b_t^* = B_t^*/N_t$  the per capita capitalized value at time  $t$  of past bequests. Because returns ( $r$ ) are positive,  $\varphi_t^M$  exceeds  $\varphi_t^{KS}$  by construction. Take for instance the illustrative economy described above. Applying Modigliani’s definition, we find  $\varphi_t^M = b_t^0/w_t = 32\%$ . Applying Kotlikoff–Summers’ definition, we find  $\varphi_t^{KS} = b_t^*/w_t = 107\%$ . Our definition produces  $\varphi_t = 74\%$  (see above).

Although the Kotlikoff–Summers definition is conceptually more satisfactory than Modigliani’s, it suffers from the opposite drawback: it mechanically produces a high inheritance share. The Kotlikoff–Summers definition estimates savers’ wealth accumulation as the difference

between aggregate capitalized inheritance and aggregate wealth. Yet each individual’s contribution to aggregate inherited wealth has to be the minimum of his or her wealth and his or her capitalized inheritance. For savers one should use capitalized inheritance. For inheritors, however, whose capitalized inheritance is greater than their wealth one should use wealth. The extent of the bias is large. In fact, as our hypothetical example illustrates,  $\varphi_t^{KS}$  can exceed 100%, even when savers account for a significant fraction of wealth. This situation arises whenever the cumulated return to inherited wealth consumed by inheritors exceeds the savers’ wealth accumulation from their labor savings. Empirically, this condition holds in Paris from 1872 to 1927, and in many countries and time periods. For instance, aggregate French series show that the capitalized bequest share  $\varphi_t^{KS}$  has been larger than 100% throughout the 20th century, including the 1950s–1970s.<sup>2</sup>

For plausible joint distributions  $G_t(w_{ti}, b_{ti}^*)$ , our inheritance share  $\varphi_t$  will typically fall between  $\varphi_t^M$ , and  $\varphi_t^{KS}$ . There is no theoretical reason why it should be so. Imagine for instance that every inheritor consumes her bequest the day she receives it, and never saves afterwards, so that wealth accumulation comes entirely from individuals who never received any bequest but saved part of their labor income. Then with our definition  $\varphi_t = 0\%$ : in this economy, 100% of wealth accumulation comes from savings, and none from inheritance. However with the Modigliani and Kotlikoff–Summers definitions, the inheritance shares  $\varphi_t^M$  and  $\varphi_t^{KS}$  will be positive

Of course, our definition is far more demanding in terms of data. While Modigliani and Kotlikoff–Summers could compute inheritance shares by using aggregate data, we require individual data. Specifically, we need the joint distribution  $G_t(w_{ti}, b_{ti}^*)$  of current wealth and capitalized inherited wealth.

### 2.4. Husbands and wives

So far we have considered individuals. This assumes that individuals systematically marry under a separation of property and income regime. However, in France, and many other countries, the most common regime involves “community of acquisitions.” In this case each spouse retains sole ownership of the assets he or she

<sup>1</sup> In the U.S., wealth concentration is actually somewhat larger: the top 10% share alone is equal to 72%. On the other hand, some top decile individuals are savers, not inheritors.

<sup>2</sup> See Piketty (2011). Kotlikoff and Summers (1981) found an inheritance share of “only” 80% for the U.S. which was quite large, while Modigliani (1986) found 20%. They both relied on US data from the 1960s–1970s, when aggregate inheritance flows were unusually low.

inherits (so-called “separate assets”), but the returns to these assets automatically accrue to the community. In this case, the wealth  $w_{ij}$  of a married couple  $ij$  breaks down into three parts<sup>3</sup>:

$$w_{tij} = w_{tij}^c + b_{ti}^0 + b_{tj}^0 \quad (2.5)$$

$w_{tij}^c$  = community wealth of married couple  $ij$   
 $b_{ti}^0$  = non-capitalized value of past bequests received by husband  $i$   
 $b_{tj}^0$  = non-capitalized value of past bequests received by wife  $j$

As we shall see, we generally do not observe  $b_{ti}^*$  and  $b_{tj}^*$  for both spouses  $i$  and  $j$  at the same time. We consider an individual,  $i$ , who is part of a married couple  $ij$ , and say that individual  $i$  is an inheritor when the following condition holds:

$$w_{ti} = w_{tij}^c/2 + b_{ti}^0 < b_{ti}^* \quad (2.6)$$

### 3. Inheritance data and matrimonial property regimes in France

#### 3.1. Estate tax data in France

To estimate the joint distribution  $G_t(w_{ti}, b_{ti}^*)$  of wealth and capitalized bequests, we take advantage of the exceptional quality of French estate tax data. In most cases, getting wealth at death and bequests received would require matching estate tax returns across two generations. That process is expensive for large populations and often suffers from severe sample attrition problems. The French matrimonial regime luckily allows us to observe wealth across two generations. The very specific rules for dividing household assets (among the surviving spouse, children, and other heirs) mandated by the Civil Code insured that detailed retrospective wealth information was recorded in the estate tax return of the first spouse to die.

Moreover, French estate tax data are both abundant and detailed. In 1791, shortly after the abolition of the tax privileges of the Old Regime, the National Assembly introduced an estate tax, which has remained

in force ever since.<sup>4</sup> Filing a return was required for almost all bequests or *inter vivos* gifts of any amount. Filing a return brought an important side benefit: it was an easy way to transfer title to property. There is ample evidence that beneficiaries followed the law. Indeed, tax rates were low until the interwar period, so there was very little incentive to cheat. In the Paris archives, individual returns go back the early 19th century.

In earlier work, we collected all the returns of Parisian decedents for a large number of years between 1807 and 1902, which we linked to national samples and to tabulations by estate and age brackets compiled by the tax administration after 1902. Initially we aimed to construct cross-sectional estimates of wealth concentration in Paris and France from 1807 to the present. So we only collected the wealth of each year’s decedents (see See Piketty, Postel-Vinay and Rosenthal, 2006). The estate tax returns, however, contain a great deal of information on the wealth trajectory of decedents, beyond wealth at death. In particular, for the subset of married decedents, tax returns record both wealth at death  $w_{ti}$  and the value of past bequests  $b_{ti}^0$ . We can use  $b_{ti}^0$  to compute capitalized bequests  $b_{ti}^*$ .

We therefore returned to the archives and collected new data from the Paris tax registers for 1872, 1882, 1892, 1897, 1912, 1922, and 1927.<sup>5</sup> As before, we collected aggregate information for every decedent in Paris who left an estate in each of the sample years. Thus, we do not estimate the distribution of wealth; we measure it directly. For a stratified subsample (approximately 100% of the wealthiest 2%, 50% of the next 4%, 25% of the next 8%, and 12.5% for other decedents with wealth), we collected detailed data on the decedent’s assets, and marital status.

#### 3.2. Community versus separate assets

Starting with the Civil Code of 1804, the default matrimonial property regime in France has been “community of acquisitions.” The regime divides the net wealth (assets minus liabilities)  $w_{tij}$  of a married couple  $ij$  into three parts. The community property  $a_{tij}^c$  includes all assets acquired after marriage (minus

<sup>3</sup> Here we ignore a number of legal and empirical complications, in particular due to asset portfolio reallocations during marriage and reimbursements between spouses, and due to *inter vivos* gifts and dowries. For more detail see section 3.

<sup>4</sup> The French Revolution had the merit of creating a data source to study wealth and inheritance much earlier than elsewhere. The United Kingdom’s estate tax dates from 1894, and the United States’ from 1916. Even then, only a small minority of the population paid the tax in these two countries (See Atkinson and Harrison, 1978; Lampman, 1962; Séailles, 1910, and Strutt, 1910. For more references, see Piketty, Postel-Vinay and Rosenthal, 2006 and Piketty, 2011).

<sup>5</sup> Our eventual goal is to have the population of Parisians estates once every five years from 1807 to the 1960s.

outstanding liabilities), while separate property  $a_{ti}^S$  and  $a_{tj}^S$  includes all assets (net of asset-specific liabilities such as business debts) which the husband  $i$  or the wife  $j$  received as bequests or inter vivos gifts (both before and while married), and which they still own in year  $t$ .<sup>6</sup> The general rule is that community assets  $a_{tij}^c$  belong to the husband and the wife on a 50%–50% basis, irrespective of whose income was used to acquire the assets. The husband and wife, however, each have sole ownership of their separate assets  $a_{ti}^S$ ,  $a_{tj}^S$ .

$$W_{tij} = a_{tij}^c + a_{ti}^S + a_{tj}^S \quad (3.1)$$

Assets that are sold during marriage as well as cash transfers follow special rules. Indeed, quite often some separate assets are sold to acquire community assets, or to raise community consumption. The couple might also receive cash dowries (and some bequests in cash). In all these cases, the Civil Code mandates the establishment of accounts for “each spouse of the reimbursement that the community owes to him or her and of the reimbursement that he or she owes to the community” (Article 1468). These accounts ( $a_{ti}^R$  and  $a_{tj}^R$ ) are in effect interest free loans to the community. When the first spouse ( $i$ ) dies, the community is dissolved and the tax returns provide us with both total values ( $a_{tij}^c$ ,  $a_{ti}^S$ ,  $a_{tj}^S$ , and  $a_{tj}^R$ ) for each group of assets, and the detailed asset portfolio composition behind each total: real estate, equity, bonds, cash, movables, etc.<sup>7</sup> Even the inherited assets  $a_{ti}^R$  and  $a_{tj}^R$  which were sold and contributed to the community during the marriage are listed because they must now be reimbursed to each spouse. Unlike actual assets that are valued at the market prices prevailing on the day of death, the reported reimbursement  $a_{ti}^R$  and  $a_{tj}^R$  are valued at nominal prices when these assets were sold, with no inflation adjustment.<sup>8</sup> They are deducted from community assets and added to separate assets to compute the

estate’s value  $e_{ti}$ .<sup>9</sup> The inherited assets of the other spouse ( $a_{tj}^S$ ) were not reported because they are not relevant to establishing the deceased’s estate.

$$e_{ti} = \left[ a_{tij}^c - a_{ti}^R - a_{tj}^R \right] / 2 + a_{ti}^S + a_{tj}^R \quad (3.2)$$

By construction these corrections cancel each other and are irrelevant to total household wealth. I.e.  $e_{ti} + e_{tj} = w_{tij} = a_{tij}^c + a_{ti}^S + a_{tj}^S$ . But they are needed to compute an individual’s estate. There is extensive evidence suggesting that reimbursement accounts were established very carefully by the agents of the heirs and closely monitored by the tax administration.<sup>10</sup>

**Example.** In 1892 Maurice Meyer died aged 69. He and his wife had married in 1858 with no assets. At his death, they owned Parisian real estate for 140,000 francs, 191,000 francs in equities, 290,000 francs in bonds, a substantial dowry to a child, and some household goods and bank accounts. Community assets came to 1,196,666 francs. These assets were all purchased during their marriage. When she was 40, Mrs. Meyer had inherited 36,370 francs from her parents. Mr. Meyer did not receive any inheritance. So we have  $a_{tij}^c = 1,196,666$ ,  $a_{ti}^S = a_{tj}^S = a_{ti}^R = 0$ ,  $a_{tj}^R = 36,370$ ,  $w_{tij} = 1,160,296$ ,  $e_{ti} = 580,148$ , and  $e_{tj} = 616,518$ .

Mr. Meyer’s estate  $e_{ti} = 580,148$  was divided between Mrs. Meyer and their four children, and Mrs. Meyer claimed the remainder of the community  $e_{tj} = 616,518$ . At her death, her wealth ( $e_{tj}$  plus the fraction of  $e_{ti}$  she received at her husband’s death plus any other asset she acquired or received in the meantime) then would be divided between the children and other heirs. Suppose, however, that Mrs. Meyer had died that day instead of her husband, then  $e_{tj} = 616,518$  would have been divided between Mr. Meyer, children and other heirs, and Mr. Meyer would have remained the single

<sup>6</sup> Strictly speaking, separate property assets also include assets acquired each spouse prior to marriage (rather than inherited). We can’t distinguish between acquired and inherited assets. However because in our study most people married relatively young and rarely divorced, we assumed the non-inherited fraction of separate property assets was negligible. To test this assumption, we re-ran the computations with the sub-samples of decedents who married early and late, and found no significant difference in the results.

<sup>7</sup> The registers actually list each piece of real estate’s address, the company name and corresponding stake for each equity or bond asset, etc. We reclassified this cornucopia into broad categories. See Section 5 below, and Appendix B for detailed results.

<sup>8</sup> Prior to World War I this was almost irrelevant, since there was virtually no inflation. Starting in 1914 inflation becomes a significant issue (for the necessary adjustments see below).

<sup>9</sup> To simplify exposition, we denote  $a_{ti}^R$  and  $a_{tj}^R$  the net reimbursement values owed by the community to each spouse (the net difference between reimbursement owed by the community and reimbursements owed to the community). The latter are usually much smaller than the former, so net reimbursement values are generally positive. Reimbursements owed to the community correspond to situations when community income was used during the marriage to raise the value of a separate asset (say, to repair the roof of a house, to repay a debt, invest in a business that was a separate asset). See Appendix B (Table B16) for full details.

<sup>10</sup> The Civil Code at large was not gender neutral. During most of the 19th century, wives had limited legal rights to sell and purchase assets (or contract debts) without the husband’s signature. Such asymmetries persisted well into the 20th century. For our purposes, however, differences between husbands and wives’ control over assets during marriage ended at death or divorce.

owner of  $e_{ti} = 580,148$  francs. When he then died, his wealth would have passed to his heirs.

These basic rules apply not just in France, but also in many countries where “community of acquisitions” is the default matrimonial regime.<sup>11</sup> Whether this regime is “good,” “fair,” or “efficient” is not our concern. Its structure, however, allows us to distinguish between acquired and inherited assets. Note that “community of acquisitions” is simply a default: it applies in the absence of a marriage contract. Couples can write marriage contracts to organize their property relationships differently with variations ranging from “complete separation of property” (each asset or income flow belongs either to one or the other spouse) to “universal community of property” (each spouse owns half of all assets). At these extremes, we are unable to distinguish between inherited and acquired assets. Fortunately, these alternative arrangements are relatively rare in our data set. Most married couples did not sign marriage contracts, and when they did they usually adopted the “community of acquisitions” regime, with only minor changes for specific assets. In Paris, from 1872 to 1927, the fraction of married decedents who fell under the default regime was at least 85% and this fraction was approximately the same over all wealth fractiles. To be sure there is some selection bias because we only observe the details of bequests in the standard regime. This bias will lead us to understate the inherited share. Indeed, the primary alternative regime is strict separation and that is most likely to be adopted by couples expecting to receive large bequests.<sup>12</sup>

### 3.3. Using estate tax data to estimate $G_t(w_{ti}, b_{ti}^*)$

Although the data reported on tax registers are very rich, they only allow us to estimate the joint distribution  $G_t(w_{ti}, b_{ti}^*)$  of current wealth and capitalized bequests for spouses who died first in a couple married under some

variant of the standard regime. Recall Mr. Meyer who died in 1892, his estate tax filing reported all variables needed to compute his estate  $e_{ti} = [a_{tij}^C - a_{ti}^R - a_{tj}^R] / 2 + a_{ti}^S + a_{ti}^R$ . These included the full list of community assets  $a_{tij}^C$ , Mr. Meyer’s separate assets  $a_{ti}^S$ , and the community reimbursements owed to Mr. and Mrs. Meyer  $a_{ti}^R$  and  $a_{tj}^R$ . But Mrs. Meyer’s separate assets  $a_{tj}^S$ , were not listed since they were irrelevant to establishing her husband’s estate, though, of course they would be in her own filing when she died. Then, however, Mrs Meyer was widowed, and her filing did not need to distinguish between the assets that came from the community and those that were her own.<sup>13</sup>

Next, we do not have systematic information about when inherited assets were received and sold. Consider a married individual  $i$  who died in year  $t$ . We know the community assets  $a_{tij}^C$  and separate assets  $a_{ti}^S$  (both at market value in year  $t$ ), and the inherited assets  $a_{ti}^R$  and  $a_{tj}^R$  that were sold during the marriage (both valued when they were sold). But we generally do not know the exact date  $t_i$  at which inherited assets  $a_{ti}^S$  were received, or the exact date  $t_i^*$  at which inherited assets  $a_{ti}^R$  and  $a_{tj}^R$  were sold. For nearly all married decedents, we have their age at death  $D_{ti}$  and their age at marriage  $M_{ti}$  (in 1912 age at death averaged 57.2, age at marriage 29.1).

We rely on external information and proceed as follows. For  $t_i^*$ , our data show that asset sales tended to take place early in marriage, with an approximately uniform distribution during the first 10 years of marriage; so we simply draw such a uniform distribution for  $t_i^*$  over the interval  $[t_{Mi}; t_{Mi} + 10]$  (where  $t_{Mi}$  is year of marriage). For  $t_i$ , since most inherited assets come from parents, we must estimate the distribution of year-of-death gaps between decedents and their parents. Very reliable demographic data shows that the average age at parenthood (which we call  $H$ ) was near 30 (with a stable standard deviation around 6 years) during the 19th and 20th centuries.<sup>14</sup> So we draw a distribution for  $t_i$  centered at  $t-30$ .<sup>15</sup> In effect, we assume that the idiosyncratic variations in  $t_i^*$  and  $t_i$  which mostly come from demographic events are uncorrelated with individual wealth.

<sup>11</sup> See “World Map of Matrimonial Property Regimes,” *Notarius International* 1–2 (2005). “Community of acquisitions” appears to be the most widespread regime (the main alternatives being “separation of property with distribution by the courts” – applied in most Anglo-Saxon countries – and “full separation of property” – applied in most Arabic countries).

<sup>12</sup> See Appendix B, Table B15. We have contractual choice for 73% of married decedents (81% in the detailed sample), “universal community” is extremely rare (12 of 33,233 cases), and “separation of property” is the only significant alternative arrangement (2205 cases). Therefore we take all married decedents with positive community assets as having the “community of acquisitions” regime, and this fraction is approximately stable around 85%–90% for all years and all wealth fractiles, except at the level of the top 0.1%, where it goes down to about 50%–60%.

<sup>13</sup> Observing both spouses’ reimbursements  $a_i$  does however give us some (imperfect but interesting) information about assortative mating. See Section 5 below.

<sup>14</sup> See Piketty (2011, Appendix C, Table C15).

<sup>15</sup> If year- $t$  decedents and their parents died at exactly the same age, then  $t-t_i$  would be exactly equal the age of the decedent’s parents when the decedent was born. However this is in general not true, which creates extra variations. We thus assume that  $t-t_i$  is uniformly distributed over  $[H-10; H+10]$ . For a more complete attempt to estimate the age distribution of inheritance receipts, see Piketty (2011), Appendix C).

We tried several alternative assumptions about the distributions of  $t_i^*$  and  $t_i$ , and found that they had relatively little impact on our final results.<sup>16</sup>

With  $t_i^*$  and  $t_i$ , it is relatively straightforward to compute capitalized bequest  $b_{ti}^*$  from available data. First, we convert reimbursement values into year  $t$  asset prices using an asset price index ( $Q_t$ ). This allows us to compute the non-capitalized value  $b_{ti}^0$  of the bequests individual  $i$  received during his lifetime (evaluated at year  $t$  asset prices):

$$a_{ti}^{R*} = a_{ti}^R \times Q_t / Q_{t_i^*} \quad (3.3)$$

$$a_{tj}^{R*} = a_{tj}^R \times Q_t / Q_{t_i^*} \quad (3.4)$$

$$b_{ti}^0 = a_{ti}^S + a_{ti}^{R*}. \quad (3.5)$$

Because inflation was negligible before 1914, the adjustment makes little difference except for 1922 and 1927 when it really matters. In effect, many of the inherited assets  $a_{ti}^R$  reported in the interwar years were sold before World War I (henceforth WWI), at much lower prices than those prevailing after 1914, so without the adjustment factor we would underestimate the importance of these assets relatively to assets  $a_{ti}^C$  and  $a_{ti}^S$  (which are reported at current prices in the tax registers). With this adjustment we now have the value of bequests received by an individual valued on the same day as his or her own estate—we can thus perform the proper calculation of Modigliani's uncapitalized inheritance to wealth ratio. We emphasize that we have not produced an exact value of uncapitalized bequests received by each individual because we do not know when they received them. Rather our estimates of those bequests are accurate on average (and until 1912 likely to be close for each individual).

### 3.4. Inter vivos gifts and dowries

Beyond the adjustments above, we must also take into account inter vivos gifts when we categorize inheritors and savers. It is critical to include inter vivos gifts received by individual  $i$  in the value of capitalized bequests  $b_{ti}^0$  (which we do, since separate assets include assets received both through bequests and through gifts). For consistency purposes, we must add the capitalized value  $v_{it}^*$  of inter vivos gifts  $v_{it}^0$  made by individual  $i$  prior to time  $t$ .

<sup>16</sup> See Appendix B, Tables B17-B18 for detailed results obtained under our benchmark assumptions and under the assumption of fixed gaps  $t_i^* - t_{Mi} = 5$  and  $t - t_i = 30$  (i.e. no idiosyncratic shock). The results for the shares of inherited wealth in total wealth are extremely close under all variations.

Before 1930, a very large fraction of inter vivos gifts took the form of dowries (gifts made to daughters and sons at their marriage).<sup>17</sup> Dowries and other gifts must be reported when the first spouse dies because the Civil Code's equal division of the estate among children includes dowries and gifts. One must also establish whether the gifts were paid out of the separate assets of a parent  $v_{it}^S$  or  $v_{jt}^S$  or from community assets  $v_{ijt}^C$ , because this affects the shares of the remaining assets going to the surviving spouse and to the children. Available evidence suggests that this legal obligation was followed. In the end, the tax administration computed the gift-corrected value of the decedent's estate  $e_{ti}$  as:

$$e_{ti} = [a_{tij}^C + V_{ijt}^C - a_{ti}^R - a_{ti}^R] / 2 + a_{ti}^S + V_{it}^S + a_{ti}^R \quad (3.6)$$

However, in the same way as reimbursement values  $a_{ti}^R$  and  $a_{tj}^R$ , the value of dowries  $v_{ijt}^C$  and  $v_{it}^S$  were reported as nominal values in tax filings. So we need to correct for this as well. We note  $t_i^*$  the time at which dowries were given to children. We draw a distribution for  $t_i^*$  on the basis of the decedent's age at death  $D_{it}$  (see above), and we convert dowries' values into year  $t$  asset prices:

$$V_{tj}^{C*} = V_{tj}^C \times Q_t / Q_{t_i^*} \quad (3.7)$$

$$V_{ti}^{S*} = V_{ti}^S \times Q_t / Q_{t_i^*}. \quad (3.8)$$

We then compute the non-capitalized value  $b_{ti}^0$  of total bequests received by individual  $i$  during his lifetime (evaluated at asset prices prevailing in year  $t$ ), and the capitalized value of those bequests:

$$b_{ti}^0 = a_{ti}^S + a_{ti}^{R*} + V_{ti}^{S*}. \quad (3.9)$$

Finally, the gift-corrected individual wealth,  $w_{ti}$ , must include the capitalized value of dowries  $v_{tj}^{C**}$  and  $v_{ti}^{S**}$  (including the cumulated return between year  $t_i^*$  and year  $t$ ), rather than simply their current price value  $v_{tj}^{C*}$  and  $v_{ti}^{S*}$ :

$$V_{tj}^{C**} = V_{tj}^{C*} e^{ri(t-t_i^*)} \quad (3.10)$$

$$V_{ti}^{S**} = V_{ti}^{S*} e^{ri(t-t_i^*)} \quad (3.11)$$

$$W_{ti} = [a_{tij}^C + V_{tj}^{C**} - a_{ti}^{R*} - a_{tj}^{R*}] / 2 + a_{ti}^S + a_{ti}^{R*} + V_{ti}^{S**}. \quad (3.12)$$

<sup>17</sup> From 1872 to 1927, dowries made up over 50% of the total value of inter vivos gifts in France, and over 75% in Paris. For a more detailed discussion of issues related to gifts and dowries, see Appendix B (and particularly the discussion about Table B14).



In effect, gift-corrected individual wealth  $w_{ti}$  is equal to the wealth that an individual would have had at death had he neither made gifts and nor consumed the corresponding return (which indeed he did not consume, since the gift was made).<sup>18</sup> So  $w_{ti}$ , as defined by Eq. (3.12), is the relevant wealth concept that ought to be compared to  $b_{ti}^*$ , as defined by Eq. (3.13), below), to determine the share of inheritors, inheritors' wealth share and inherited wealth shares  $\rho_t$ ,  $\pi_t$ , and  $\varphi_t$ . All results presented below were obtained by applying these equations to the raw data coming from tax registers.

### 3.5. Capitalizing bequests

Next, we must capitalize  $b_{ti}^0$  where:

$$b_{ti}^* = b_{ti}^0 e^{ri(t-ti)} \quad (3.13)$$

Because we adjusted the reimbursement accounts for price changes, bequests are valued on the day the person died, so they include the capital gains or losses he or she experienced. Missing, however, are the flow returns since those went into the community account. The choice of appropriate flow returns  $r_t$  is particularly important because the capitalization interval averages thirty years and is a convex process: a 1% annual return produces a capitalized bequest 35% larger than its initial value, 3% leads to a 142% increase and 5% leads to a 332% increase. These values should be put in a nineteenth century perspective when flow returns were substantial since there was little inflation, bonds paid at least 3% of par, shares often paid 5 or 6% as dividends, and real estate paid rent.

It might seem ideal to attribute a specific return to each asset in the data set. That is impossible since the bulk of assets are not publicly traded. Doing so only for those publicly traded assets where income flows are available creates insurmountable problems of selection. In any case, trying to put a return to each asset is also suspect because if inheritors refuse to rebalance their wealth portfolio (e.g. hang on to the low return family castle) they are foregoing the option of the diversified (and higher) return to consume tradition. In this light, the right capitalization is always the aggregate return to capital in the economy. We chose a route between the two extremes of a common aggregate return (a la

Kotlikoff and Summers) or a fully differentiated set of returns. We group assets into three or four classes to which we attribute flow returns and then the portfolio of each individual provide the weights to attribute to each assets class.

Our first approach is macro-economic in spirit (see Piketty, 2011, Tables A11–A12). We use the macro-economic capital income flows, and leave out capital gains and losses. Each year's value is simply the national income accounts' ratio of private capital income (including undistributed profits, dividend, interest, and rental income) to aggregate private net wealth.<sup>19</sup> Rates of return are highest from the 1840s to the 1860s when manufacturing boomed while wages stagnated. The decline in rates of return starting in the 1870s corresponds to the rise in the wage share. The rise in rates of return during the interwar period corresponds to the large fall in asset values (capital losses). The broad evolution of the aggregate return is consistent with a large number of independent sources, but the exact magnitude of these changes is of course imperfectly measured.<sup>20</sup>

We then break these aggregate rates of return into returns for three categories of assets: real estate (including both Paris-based and out-of-Paris real estate assets); high risk financial assets (e.g. equities and private sector bonds); low risk financial assets (e.g. government bonds, bank and savings accounts, and other financial assets). Consistent with our micro data and other sources we fix the average portfolio composition for France at 45%–35%–20% and for Paris at 35%–45%–20%. For real estate, available series on net rental income show that the flow return to real estate assets was near 4.25% throughout the 19th century, with a slight decline to about 3.5% by the end of the century (and a rebound in the interwar period, again due to capital losses and low asset values). For low risk financial assets we use the interest rate on public debt.<sup>21</sup> Average returns to high risk financial assets were then computed so that the weighted average of the three returns reproduces the aggregate return on capital. So, for instance, in 1900 we have an average rate of return of 4.6%, which given a real estate return of 3.5% and a low risk financial asset return of 3.0%

<sup>18</sup> Note that in a number of cases dowries were promised but not given to children. However this appears to be a very small fraction of cases, and we do not make any special correction there. In any case, note that since most dowries were given relatively shortly before death (see above), the dowry capitalization effect is bound to be correspondingly small.

<sup>19</sup> These series are available on a yearly basis since 1896, and on a decennial basis before.

<sup>20</sup> All details about data sources and methodologies used in the construction of these national accounts series are given in Piketty (2011, Appendix A).

<sup>21</sup> Detailed data sources are given in Piketty (2011, Appendix A, pp.29–30).

implies a high risk financial asset return of 7.0%.<sup>22</sup> Parisians returns are somewhat larger than the national average, because of a higher portfolio share of high risk financial assets. This first approach has two important advantages: the returns cover traded and untraded assets and they are consistent with macro-economic accounts. Because individuals have varying portfolio weights their returns range from a low of 3.5% (for individuals wholly invested in real estate at the end of the 19th century) to a high of 11% (for those entirely in equities in the 1920s).

The first approach may seem too optimistic because the macro-economic flows imbed some return to entrepreneurship and to financial intermediation. Our second approach provides flow returns that are closer to those of a purely passive investor. It breaks assets down into four categories. The return to cash, deposit accounts and household goods (roughly 14% of personal assets) is zero. For real estate, we start with the gross return implied by the tax authorities' approach to valuing real-estate and then deduct 1% for management and maintenance (or one fifth of the gross rent flows). This produce a 4% flow return to the owners. For bonds, we use the return of government bonds, the most traditional and low return investment. For stocks, we used the dividend yield Le Bris computed for his historical CAC40, the most traditional equity investment (Le Bris, 2011 p. 61; Hautcoeur and Le Bris, 2010). With the fixed portfolio (30% real estate, 34% equities, 22% bonds, 14% cash equivalents) the average return ranges between 3 and 4% overtime. As in our first approach, weights come from individuals portfolios, so returns range from a low of 3% (for individuals wholly invested in bonds at the end of the 19th century) to a high of 5.7% (for those entirely in equities under the Second Empire).

Taken together with the need to estimate the capitalization interval, our estimates of individual capitalized bequests are almost surely wrong. Some decedents have too long a capitalization interval, others too short, some are attributed flow returns that are too low (because they been lucky in their asset choices) other too high returns (because they invested in their period's Panama boondoggle). But our goal is not to produce individually accurate returns, but rather returns that are reasonably accurate in the aggregate. The size of our samples is sufficient that these errors do not

matter to the aggregate measures. More importantly, both approaches give very similar answers to the key questions we are asking. We thus focus on the first set of estimates. In fact, our findings about rentiers and inherited wealth shares are extremely robust, something we will return to at the end of Section 4.

## 4. Paris 1872–1927: a rentier society

### 4.1. Descriptive statistics

The population of Paris rose sharply between 1872 and 1912, and so did the annual number of adult decedents: from about 25,000 decedents in 1872 to over 35,000 decedents in 1882–1912, and a bit less in the 1920s (See Table 1). Before 1912 at least 70% of adult Parisians died with no wealth at all (at a time when it was about 50% for the all of France). That share only began to fall in the 1920s, but it was still above 60% in 1927.

Second, although poor people were more frequent in Paris than in the rest of France, there was an abundance of rich people. Average wealth at death in Paris (including decedents with zero wealth) was four to five times larger than in the rest of France. As a consequence, with a population share near 5%, Parisians owned about a quarter of French wealth (see Fig. 1). In 1912, the average estate left by Parisians decedents with wealth was over 130,000 francs. The average estate left by the top 10% decedents was about 370,000 francs; for the top 1%, it was 2.4 million francs. To put these numbers in perspective, average national income per adult  $y_t$  was about 1500 francs in 1912, and average labor income per adult  $y_{Lt}$  was about 1000 francs.<sup>23</sup> With a rate of return  $r = 4\%$ , an estate of 2.4 million francs generates an annual income of about 100,000 francs or the equivalent of 100 times the average labor income of the time. By way of comparison, the top 1% labor income earners received less than 10 times the average labor income. The top 1% successors could sustain living standards far beyond what labor alone would permit even if they consumed only a fraction of their capital income. The level of wealth concentration from 1872 to 1927 in Paris is astonishing and relatively stable. The top 1% share in wealth rose from 52% in 1872 to 63% in 1912, started declining in the aftermath of WWI, and was still 58% in 1927 (see Fig. 2).

<sup>22</sup> More precisely, high-risk financial asset returns were computed as residuals, and then were uniformly reduced in decades when they seemed excessively high (i.e. above 10%; 1830s–1870s and 1920s–1930s), so as to take into account mismeasured entrepreneurial income. For details see Appendix A Table 9.

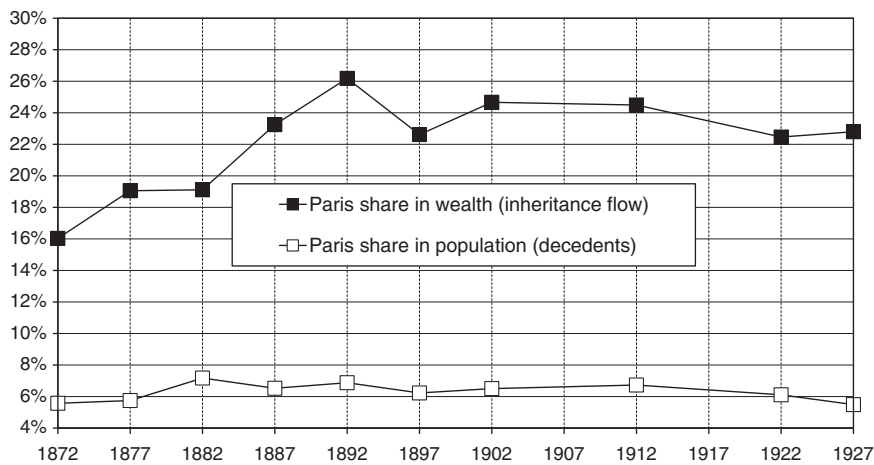
<sup>23</sup> For background data on the national income and wealth accounts of France and Paris at that time, see Appendix A. For detailed results and tables from our micro data collected in Paris estate tax archives, see Appendix B.

Table 1

Inheritance in Paris, 1872–1927 — summary statistics.

Source: *Annuaire Statistique de la Ville de Paris* (various years) and Archives de Paris Series Dq7 and Dq8.

	N. decedents (20-yr +)	N. decedents with estate > 0	% decedents with estate > 0	Average estate (estate > 0) (current francs)	Average estate (all decedents)	Average labor income	Average estate (estate > 0) (years of labor income)	Average estate (all decedents)
1872	24,356	6938	28%	88,070	25,088	725	121	35
1882	36,797	9420	26%	98,557	25,230	812	121	31
1892	37,045	9671	26%	152,705	39,864	924	165	43
1897	34,103	8998	26%	136,771	36,086	918	149	39
1912	36,881	10,318	28%	133,547	37,362	1057	126	35
1922	33,300	10,790	32%	166,288	53,883	4259	39	13
1927	31,420	10,736	34%	257,835	88,104	7069	36	12

Fig. 1. Paris' share in French inheritance, 1872–1927. Source: *Annuaire Statistique de la France* (various years) and *Annuaire Statistique de la ville de Paris* (various years).

Although inequality remained broadly stable, WWI induced big movements in asset prices relative to consumer prices. From 1872 to 1912, prices were stable, and wealth accumulation proceeded steadily at about 1% per year. Between 1912 and 1927, however, consumer prices rose 500% while asset prices (real estate or equities) increased less than 200% (see Table 2). Expressed in constant consumer prices, the estates of the interwar period are worth about half those of 1912. But expressed in constant asset prices, they look just 20%–30% smaller. In effect, the asset price decline that followed 1914 destroyed the value of estates relative to labor income flows, which roughly followed consumer prices. Before 1912, the average positive Parisian estate was worth about 120 years of average labor income. By 1922, it had fallen to only 35 years of average labor income.

#### 4.2. Asset composition and portfolios

Parisian wealth portfolios were strikingly diversified and sophisticated. The share of real estate assets in total gross assets was about one third (including about 20% in Parisian real estate and 10% in out-of-Paris real estate), while financial assets amounted to about two thirds of wealth. Most importantly, Table 3 shows that, in the aggregate, Parisians' financial portfolios were very diversified. In 1912, the 62% of total gross assets held in financial assets split into 20% in equities, 18% in private bonds, 14% in government bonds, and 9% in other financial assets.<sup>24</sup>

<sup>24</sup> Checking accounts, cash, current income including pensions, etc. For detailed results with more asset categories, see Appendix B.

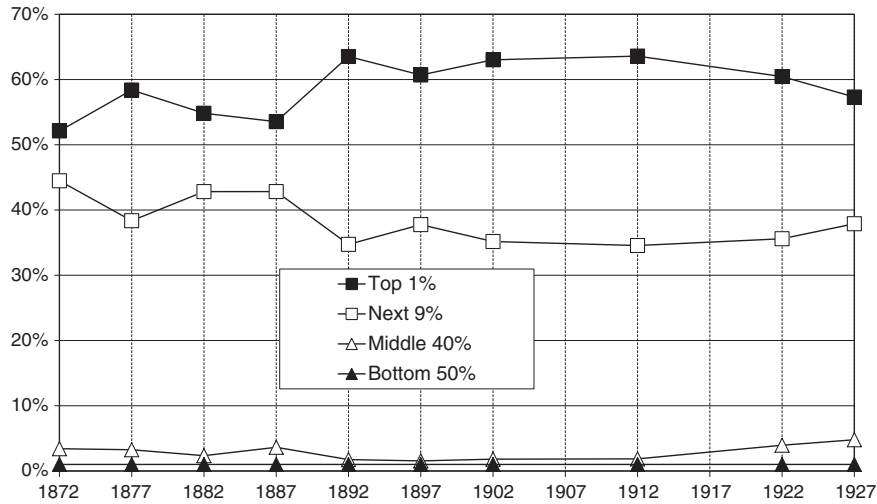


Fig. 2. Wealth concentration in Paris, 1872–1927. Source: *Annuaire Statistique de la ville de Paris* (various years), and Archives de Paris Series Dq7 and Dq8.

Table 2

Average estate and average labor income vs price indexes in Paris 1872–1927 (1912 = 100).

Source: See Table 1 and Piketty, 2011.

	Average estate (estate > 0) (nominal index)	Average labor income	Asset price index	Consumer price index	Average estate (estate > 0) (relative to asset price index)	Average labor income (relative to consumer price index)	Average estate (estate > 0) (relative to consumer price index)	Average labor income
1872	66	69	96	97	69	72	68	71
1882	74	77	96	98	77	80	76	79
1892	114	87	90	91	127	97	125	96
1897	102	87	86	87	119	101	118	100
1912	100	100	100	100	100	100	100	100
1922	125	403	199	312	62	202	40	129
1927	193	669	268	574	72	249	34	117

Before WWI, foreign financial assets were a growing share of bond and equities: foreign financial assets went from 7 to 20% of wealth between 1872 and 1912. Foreign assets fell during WWI (default on Russian bonds, etc.), but less than we expected, because foreign holdings were more diversified than sometimes believed. One can also see a shift towards equity and a relative decline of bonds during the interwar period, likely because bond values and the bond market at large were severely damaged by over ten years of high inflation.

Because the upper class (top 10%) always owned over 90% of total assets, Table 3 mostly reflects the portfolios of the upper class. The top 1% and the next 9% had very similar asset composition (except that the former held more foreign assets: 24% vs 14% in 1912). The middle class (middle 40%) is quite different: while the upper class held two thirds of its real estate in Paris,

most of the middle class' real estate was outside Paris. Also, while the upper class held less than 5% of its wealth in low-return movables, for the middle class it was more than 10%. But overall the aggregate middle class portfolios were also quite diversified, with a real estate/financial assets break down around 1/3–2/3, and very balanced financial portfolios.<sup>25</sup> As compared to the enormous differences in total wealth levels across groups, the differences in portfolio composition are modest. The same conclusion applies when we compare portfolios across age group.<sup>26</sup>

<sup>25</sup> See Appendix B, Table B11.

<sup>26</sup> See Appendix B, Table B10. Older individuals have slightly more real estate and low-risk financial assets, middle-aged individuals have slightly more high risk financial assets and liabilities; but by and large these differences look relatively small (as a first approximation).

Table 3  
Asset composition in Paris 1872–1927.

	(% gross assets)							Household goods
	Real estate assets	Total financial assets	Within financial assets				Total foreign financial assets	
			Equity	Private bonds	Govt bonds	Other, cash,..		
1872	<b>34%</b>	<b>63%</b>	17%	21%	15%	10%	7%	<b>3%</b>
1882	<b>34%</b>	<b>63%</b>	18%	21%	16%	8%	8%	<b>2%</b>
1892	<b>27%</b>	<b>72%</b>	19%	28%	17%	8%	21%	<b>2%</b>
1897	<b>33%</b>	<b>65%</b>	17%	22%	18%	8%	13%	<b>2%</b>
1912	<b>36%</b>	<b>62%</b>	20%	18%	14%	9%	20%	<b>3%</b>
1922	<b>27%</b>	<b>69%</b>	25%	13%	19%	11%	15%	<b>4%</b>
1927	<b>24%</b>	<b>70%</b>	37%	10%	13%	11%	20%	<b>6%</b>

Note: Out-of-Paris real estate assets are missing in 1872–1897; in 1912–1927, they make about 1/3 of real estate assets.  
Source: Archives de Paris Series Dq7 and Dq8.

### 4.3. Inherited assets and portfolio reallocations during marriage

If we now turn to married decedents and compare community assets with inherited assets, we again find very diversified portfolios for both community and separate assets. There is one important difference however: inherited assets contain more real estate (both from Paris and out of the city) than community assets. Families might have tried to hold on to inherited real estate. But there is another factor: real estate's share of wealth has long been declining. Separate assets reflect the portfolios of the previous generation and thus would have to have a higher share of real estate than the community. More importantly, married couples sold or gave away a very substantial fraction of their inherited assets during their marriage — between one third and one half (see Fig. 3). As one can see, the share of currently owned inherited assets ( $a_{it}^S / (a_{it}^C / 2 + a_{it}^S)$ ) peaked at 42% in 1912. That is, the vast majority of assets owned by married couples when the first spouse died were community assets acquired during marriage. Nevertheless, many of these assets had been acquired using cash gifts or by selling some inherited assets. Once this is taken into account, uncapped inherited assets  $b_{it}^0$ , amount to more than 50% of wealth (see Fig. 3). In other words, the portfolio reallocations during marriage cannot be ignored when estimating the role of inheritance in wealth accumulation. Defining inherited assets as only those transmitted intact through the generations would lead to a massive understatement.<sup>27</sup>

<sup>27</sup> The fraction of inherited assets sold or given during marriage was low in 1912 (about 25%), perhaps because wealth holders were particularly prosperous in 1912 and faced less of a need to sell inherited assets.

So far both of the inherited assets shares reported on Fig. 3 measure the share of uncapped inheritance. The fraction  $b_{it}^0 / w_{it}$  simply corresponds to the Modigliani definition  $\varphi_t^M$  of the inheritance share in wealth accumulation. Now, it is clear that with an uncapped inheritance share above 50%, the capitalized inheritance share  $\varphi_t^{KS} = b_{it}^* / w_{it}$  defined by Kotlikoff–Summers will exceed 100%. With a modest, exogenous rate of return  $r = 3\%$ , the capitalized inheritance share  $\varphi_t^{KS}$  is always above 100%. With a more realistic, exogenous rate of return  $r = 5\%$ , it is near 200% (see Fig. 3). These estimates are consistent with the uncapped and capitalized bequest shares series recently computed for France on the basis of aggregate data (see Piketty, 2011).

Our findings are remarkably similar for each sex starting with portfolio reallocations during marriage. Considering all married decedents, or breaking down married decedents by wealth fractiles, reimbursement and dowry values are about the same for both husbands and wives.<sup>28</sup> Moreover, the overall share of inherited assets in total assets is also gender neutral (i.e. it is almost identical whether husbands or wives die first), both at the aggregate level and in all wealth fractiles. These findings imply that, on average, husbands and wives brought assets of similar value to their marriage. This is not surprising: French inheritance laws are themselves gender neutral. These findings also suggest that the ability and willingness of each spouse to convince the other spouse to part with his or her

<sup>28</sup> With the possible exception of the 1920s, when wives' inherited assets were sold and given more often than husband's inherited assets. However this is marginally significant, and holds only in married couples where the husband died first (when the wife died first, symmetry still prevails). For detailed results, see Appendix B, Table B16.

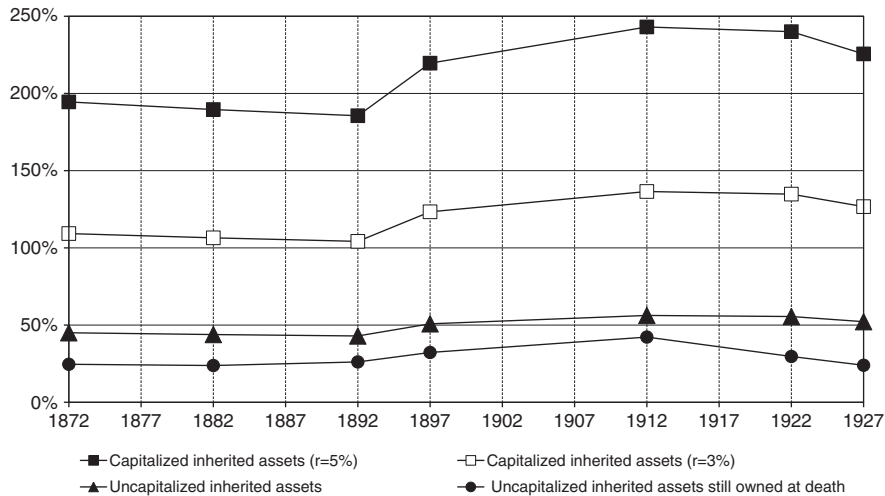


Fig. 3. Uncapitalized vs capitalized inheritance share in aggregate wealth (standard definitions). Source: See Fig. 2.

inherited assets were relatively symmetric over this time period. We did not assume this would be true since married women clearly had less control over their assets than their husbands.<sup>29</sup> Unfortunately, as was already stressed in Section 2, we cannot go much further with our data set. In particular, we cannot precisely estimate the degree of assortative mating (which seems to have been very high), because we do not observe the unsold inherited assets of the surviving spouse.<sup>30</sup>

#### 4.4. Inheritors vs savers: aggregate results

We now come to our main results on inherited vs self-made wealth. Our benchmark estimates are plotted on Fig. 4. Like other measures of inequality the fraction of rentiers in total population  $\rho_t$  was stable (between 8 and 11%). Only about one tenth of the Parisian population had wealth  $w_{it}$  below the capitalized value of their inherited assets  $b_{it}^*$ . These individuals had consumed more than their labor income during their lifetime. Although rentiers were a minority of the population, they were important. Given that two thirds of the population had zero (or near zero) wealth when they died, the fraction of rentiers within the population holding wealth was actually large; near 30% throughout the period.

<sup>29</sup> See Section 3 above.

<sup>30</sup> The fact that the symmetry in asset sales holds in all wealth fractiles, and that we also observe very high individual-level correlation between husbands' and wives' asset sales, certainly suggests a very high degree of assortative mating.

Next, and most importantly, rentiers alone owned at least 60% of wealth and up to 70%. There is little trend from 1872 to 1927, because the increase in uncapitalized inherited assets share seems to be approximately compensated by the decline in rates of returns and capitalization factors. Finally, we must add non-rentiers' 40% of wealth only a quarter came from an inheritance they let grow, the other three quarters came from labor earnings. This means that non-rentiers are very different from rentiers: they really are savers who became wealthy by saving from their labor income. Even in 1912, at the peak of the rentier society, when  $\pi_t = 70\%$  and  $\varphi_t = 80\%$ , non-rentiers got only about a third of their wealth through inheritance. From 1872 to 1927, the average ratio  $b_{it}^*/w_{it}$  was between 25% and 30% for non-rentiers, and between 300% and 400% for rentiers.<sup>31</sup> Savers were accumulating about three times more wealth than what they were receiving from their parents. Rentiers were doing the opposite. They ended with wealth three or four times smaller than they would have had had they reinvested the income flows from bequests they received from the previous generation. Rentiers were consuming two thirds or three quarters of the capitalized value of their inherited wealth. Clearly, two very different kinds of wealth accumulation processes operated simultaneously in Paris (and presumably in every society, of course with varying proportions). It is important to distinguish between these two processes and groups of people. If we mix everybody together in a

<sup>31</sup> See Appendix B, Table B18.

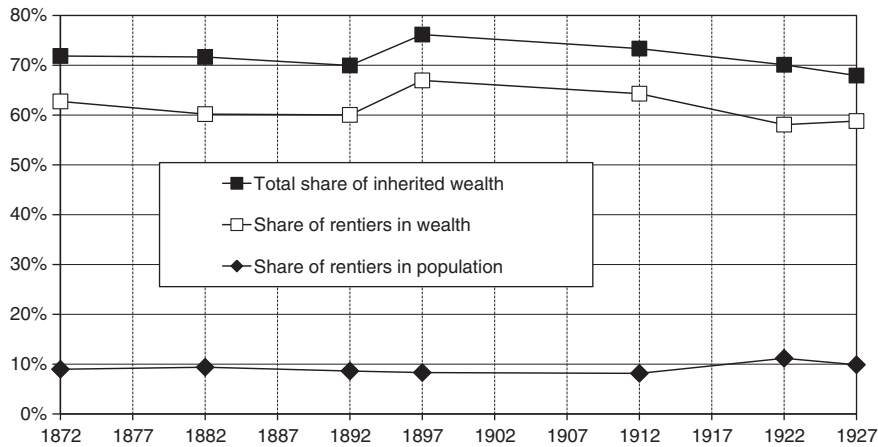


Fig. 4. Rentiers in Paris, 1872–1927. Source: Authors' computations. See also Fig. 2.

representative agent model and ignore this heterogeneity, it is unlikely that we will properly understand the overall process of wealth accumulation.

#### 4.5. Robustness of the findings with respect to the rate of return

Could our high inherited wealth shares simply be the product of picking a high or uniform rate of return? In the data appendix, we provide estimations with idiosyncratic shocks and with different uniform rates of return. Overall, the different simulations produce the same results over and over again. We discuss them briefly here and then move on to explaining this stability.

For idiosyncratic shocks, we start with observed individual portfolios and observed average returns for real estate assets, high-risk financial assets and low-risk financial assets. We then draw a normal distribution of realized returns around the average high-risk financial return. Very large noisy returns reduce rentiers shares in wealth and total shares of inherited wealth, but only a little. In 1912, our benchmark estimates put the share of inherited wealth ( $\varphi_t$ ) at 74%. ( $\varphi_t$ ) falls to 73% with a shock variance equal to 50% of the high-risk average rate, and to 68% with a variance of 100%.<sup>32</sup> Clearly idiosyncratic shocks have very little impact.

We also re-estimated  $\rho_t$ ,  $\pi_t$  and  $\varphi_t$  under the assumption of a fixed, exogenous return throughout the 1872–1927 period (e.g.  $r = 3\%$ ,  $r = 4\%$ ,  $r = 5\%$  etc.). Our motivation for completely shutting down time variation in returns is the worry that our flow returns are

mismeasured. For instance, available series suggest that the average rate of return was higher in the 1850s–1870s than in the 1880s–1900s (say, 6% vs 4%–5%). This could be true, but it could also be that the early data are worse and overestimate profits while underestimating entrepreneurial labor income. Such an error would lead to too large a capital income share (and thus too large a flow rate of return). Given the limited quality of the raw statistical material on labor income and capital income, there is no way we can exclude such a possibility. Our standardized rates of return are a simple way to address this problem.

Varying the aggregate return alters our results in predictable but limited changes. Consider two massively different scenarios:  $r = 3\%$  versus  $r = 5\%$ . The first results are clearly lower than the second but they are also fairly similar.<sup>33</sup> The population shares of rentiers  $\rho_t$  are stable around 10% and rentiers wealth shares  $\pi_t$  and total inheritance shares  $\varphi_t$  fall less than 10% when we go from  $r = 5\%$  to  $r = 3\%$ . This contrasts sharply with the enormous impact of the rate of return on the representative-agent definitions. In the same data, moving from  $r = 3\%$  to  $r = 5\%$  drives the capitalized bequest share in wealth  $\varphi_t^{KS}$  (Kotlikoff–Summers definition) up from 120%–150% to over 200%–250% (see Fig. 4 above).

Why are our estimates so stable? Two key reasons come to light when we consider the uncanceled inherited wealth share ( $b_t^0/w_t$ ): one is definitional and the other is empirical. The first is that our definition of

<sup>32</sup> See Appendix B, Table B18, and Fig. B1 for detailed results.

<sup>33</sup> We provide other robustness checks corresponding to alternative assumptions on rates of return in Appendix B, Table B21 (in particular, we combine idiosyncratic and aggregate shocks).

inherited wealth bounds the impact of flow rates of return at both ends of the distribution of  $b_{it}^0/w_{it}$ . First, individuals who themselves received little or nothing ( $b_{it} \approx 0$ ) do not contribute to inherited wealth no matter what return we use. For individuals who got large bequests ( $b_{it}^0/w_{it} > 0.75$ ) even a flow rate of 1% will turn them into rentiers, at which point they contribute their entire wealth to inherited wealth, and any further increase in return is irrelevant. Increasing the flow rate of return does increase the inherited wealth share because it increases the contribution of those individuals who have some inherited wealth but are not yet rentiers.

This brings up the second, empirical, issue: just how large is this middle group? It is always small. In practice the distribution of uncanceled inherited wealth shares ( $b_{it}^0/w_{it}$ ) is roughly bimodal: many people inherited little or no wealth ( $b_{it}^0/w_{it} < 0.1$ ). There is a smaller but sizeable number of individuals who inherited a lot ( $b_{it}^0/w_{it} > 0.55$ ). They also die quite rich so there is a lot of wealth at the top end. As Fig. 5 shows, this is true in every cross section: roughly 50% of the population has a  $b_{it}^0/w_{it} < 0.1$  and they account for about 20% of the wealth. No reasonable rate of return will turn them into rentiers. Conversely roughly 35% of the population has ( $b_{it}^0/w_{it} > 0.55$ ) and they command from 45 to 60% of the wealth. Even a flow return of 2% would make them rentiers after 30 years. Increasing the flow above 2% matters to these people because they can consume more but it does not raise their contribution to inherited wealth because it is bounded above by their wealth at death. That leaves about 15% of the population that

owns about 20% of the wealth to be influenced by returns. Raising the flow return to 4% brings the threshold  $b_{it}^0/w_{it}$  down to 0.31, increasing the proportion of rentiers to about 45% and their wealth share to about 65%. Finally as we increase flow returns above 6%, the share of rentiers grows slowly and the share of inherited wealth also converges to a level less than 90%.

Fig. 6 shows that Paris was a rentier society. For reasonable rates of return (3% to 5%), there were two important groups. On the one side, there are those who had inherited a lot ( $b_{it}^0/w_{it} > 0.6$ ) and who were rentiers at any  $r > 2\%$ . Given  $r = 3\%$  or higher their  $b_{it}^*/w_{it}$  had to be large (300%–400%) so they could consume part of the flow returns and all of their labor returns. The other group were those who inherited little ( $b_{it}^0/w_{it} < 0.2$ ). Even with  $r = 5\%$  they must have saved substantial amounts from labor income to accumulate the estate they left behind. In between there was about 10% of the population (that held about 20% of the wealth).

#### 4.6. Inheritors vs savers: results by wealth fractile

Now consider the population shares of rentiers  $\rho_t(w)$ , the wealth shares of rentiers  $\pi_t(w)$ , and the total shares of inherited wealth  $\varphi_t(w)$ , for all wealth fractiles  $w$ . Theory provides little guidance as to the correlations between wealth and rentiers. To the extent that entrepreneurship plays an important role for building large fortunes, one could expect rentiers and inheritance shares to decline at the top of the wealth hierarchy.

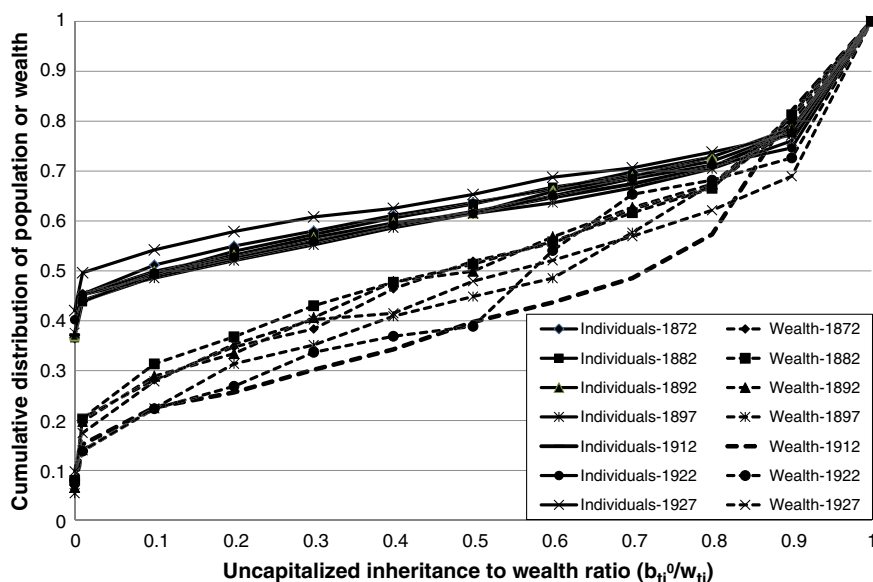


Fig. 5. Distribution of uncanceled inheritance to wealth ratios. Source: Authors' computations. See also Fig. 2.



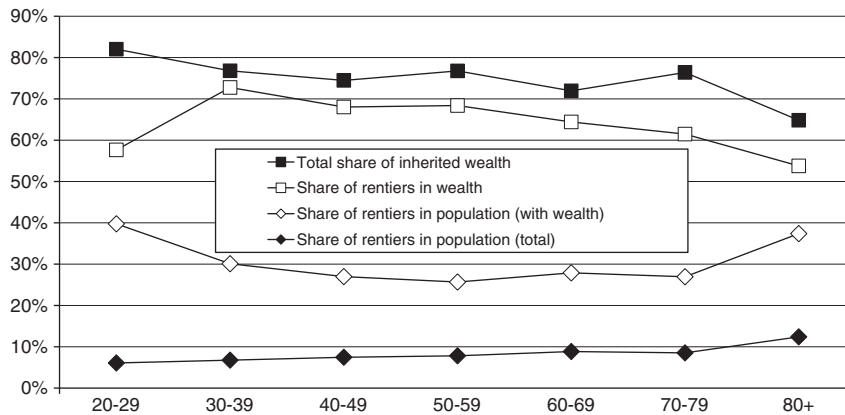


Fig. 6. Rentiers by age group in Paris 1912. Source: Authors' computations. See also Fig. 2.

However we find exactly the reverse: the share of rentiers in population and in wealth grew with wealth fractile. We report the results for 1912 in Table 4.<sup>34</sup>

The connection between rentiers and wealth fractiles is spectacular. In 1912, rentiers made up only 25% of the middle class (wealth fractile P50–99), and over 70% of the “very rich” (P99–100). Since rentiers tend to have somewhat larger average wealth than non-rentiers in each wealth fractiles, the wealth shares  $\pi_i(w)$  are somewhat larger than  $\rho_i(w)$ . These shares grow from 40% for the middle class, to 60% for the middle rich, to over 75% for the very rich. If we now add the inherited wealth of non-rentiers, we find that total inheritance shares  $\varphi_i(w)$  are again a bit higher, and range from over 40% for the middle class to 70% for the middle rich and over 80% for the very rich.

Although rentiers dominated the top of the wealth distribution, Paris was far from a frozen society. In each of our years and within each wealth fractile, including at the very top, there was always a sizeable fraction of savers. Even among the very rich savers and rentiers are different from each other. Indeed the share of inherited wealth  $\varphi_i(w)$  is only a bit higher than the rentiers share of wealth  $\pi_i(w)$ . Savers had started poor. For instance, a quarter of the top 1% had inherited little wealth, and managed to make their way to the top of the wealth heap. We might call these people “entrepreneurs.” Their average capitalized bequest to wealth ratio ( $b_{ti}^*/w_{ti}$ ) was about 30%. This is higher than what we find for middle class savers (for whom the corresponding ratios are generally less than 10%), but this still means that 70%

of their wealth was self-made.<sup>35</sup> If we compute the  $b_{ti}^*/w_{ti}$  ratios for the rentiers of the top 1%, then we again find ratios above 300%.

#### 4.7. Looking for life-cycle wealth: results by age group

Although rentier's wealth at death is, by definition, less than capitalized inherited wealth, it does not follow that they had no life-cycle wealth accumulation. They could have saved out of labor income to make inter-vivos transfers that we do not see at death. These transfers had already been ‘consumed,’ and unlike dowries, no one bothered to record them. In principle, if life-cycle wealth accumulation plays an important role, one should see more self-made wealth in middle age groups than in older groups. The share of rentiers is a bit lower among the middle aged than older groups, but the difference is tiny and thus the life-cycle effect is small (see Fig. 6 for 1912). This same flat pattern prevails in the other cross sections.

The small rise of middle class wealth that began in the 1920s was not driven by any invention of life-cycle savings. Instead, the middle class started accumulating wealth as their income rose, allowing them to own or transmit assets. To be sure this conclusion stems partly from the fact that we look only at transmissible (non-annuitized) wealth. Pension (annuitized) wealth began to grow with the mandatory retirement savings programs put in place in the last third of the nineteenth century. Because these programs initially targeted civil

<sup>34</sup> The profiles of other years are similar. See Appendix B, Table B18.

<sup>35</sup> See Appendix B, Table B18. One problem is that our individual level definitions assume perfect assortative mating (see Section 3 above). The estates of those people who started poor, but married someone with large inherited wealth, could be composed of their share of their spouse's dowry flow returns.

Table 4  
Rentiers by Wealth Fractile 1912.

	(% gross assets)		
	Share of Rentiers in population	Rentiers' share of wealth	Share of inherited wealth
P50–90	21%	28%	33%
P90.01–99	42%	53%	63%
P99.01–100	66%	72%	81%

Source: Authors' computations, and Piketty (2011).

servants and relatively high income employees, they played out principally within the middle class. To some extent, we observe this transition in the estate tax returns, because pension income for the days between the last payment and death was included to the pensioner's estate. For the middle class, the corresponding pension wealth appears to have been at least as large as transmissible wealth during the interwar period. For Paris as a whole, the dominance of top estates is such that middle class wealth does not matter much: rentiers and inherited wealth are just very important in wealth accumulation.<sup>36</sup>

#### 4.8. The beginning of the end of rentiers

Most of the foregoing has stressed the remarkable stability of inherited wealth in the first period of financial capitalism (1872–1912) and the surprising continuity of the early interwar estates. But behind this apparent stability, the 1920s hide the beginning of dramatic changes. WWI was a catastrophe for the wealthy as the value of estates relative to consumer prices and labor income flows plummeted. This is easy to show if we examine how wealth holders divided the flow returns on their inheritances between consumption and accumulation for bequests.

We computed the living standards enjoyed by top Paris rentiers dying in 1872–1927 and compared these to the equivalent living standards which they left to their heirs. While the comparison works at the individual level, it also works at the household level assuming assortative matching and two children per household (each child receiving half an estate from each parent is equivalent to getting the whole estate from one parent). More precisely, we compute the difference between the flow rate of return ( $r$ ) and the capitalization rate ( $\underline{r}$ ) necessary to reach  $w_t$  from  $b_{it}^0$  in  $t-t_i$  years for Parisian rentiers who belonged to the richest 1%. This then produces an annual income  $b_{it}^0(r - \underline{r})$

<sup>36</sup> See Appendix B, Table B14 for a detailed discussion of the data on pensions.

that was consumed. We scale the income a rentier consumed since the time of inheritance ( $t$ ) by the average labor income  $y_{Ls}$  for all years  $s$  in  $[t_i; t]$ .<sup>37</sup> We estimate the living standards which decedents left to their heirs using a fixed rate of return  $r = 4\%$  to their estate  $w_t$ . The results are quite spectacular (see Fig. 7).

From 1872 to 1912, the rentier society was self-sustaining, in the sense that top rentiers left to the next generation enough wealth to enjoy the same living standards they themselves had experienced (approximately 90 times the average labor income of the time). Top rentiers who died before WWI could consume 80 times average labor income from their inheritance over the roughly 30 years after they inherited. In 1872–1912, top 1% estates were approximately equal to 2500 times average labor income, so they were definitely large enough to sustain living standards of approximately 100 times average labor income for the next generation. Top rentiers who died after 1920 consumed almost as much as pre-WWI rentiers, but they left their heirs only enough to consume 30 times average labor income.

These massive levels of consumption are perhaps overstated because some of the income to separate assets may have been reinvested directly into those assets without transiting through the community account. But this problem is both limited and persistent: it would reduce rentier consumption in all periods. It certainly cannot explain the abrupt decline of inheritances after WWI. Conversely we also omit any labor income from our computations because we do not know whether our individual rentiers worked or not, or how much they earned. Some, if not many of our pre-WWI rentiers did work, and they may earned the equivalent of (say) 10 times average labor income, in which case they could consume 110 times average labor income instead of 100. Nonetheless, before WWI, even without working, rich rentiers enjoyed very high living standards.

The collapse in asset values during WWI broke this pattern. To return to the pre-1914 equilibrium, rentiers would have had to consume much less, or work much more, or both. Those who died in 1922 had no chance to repair their fortunes. They had done most of their saving and consumption before the war and had little time to adjust before dying. Even those who died in 1927 had spent half their adult lives before the war and less than a third in the post shock economy. Our data suggests that rentiers consumed almost as much of the flow return as their prewar counterparts, and therefore bequeathed

<sup>37</sup> See Appendix B, Table B18, and corresponding computer codes, for full details. We also did the same computations with fixed rates of returns and found similar results.

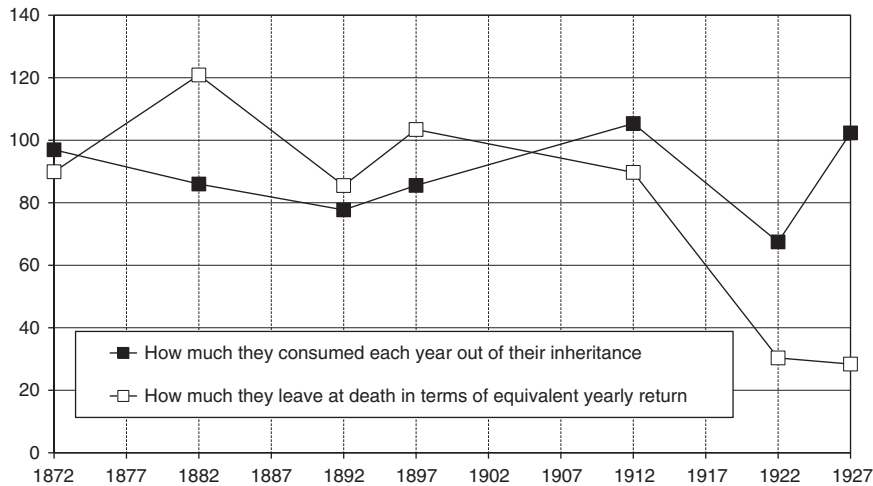


Fig. 7. The living standards of Top 1% Paris rentiers (multiples of average labor income). Source: Authors' computations, and Piketty (2011). See also Fig. 2.

much less than what they received. The inadequate consumption adjustment following the shock also helps explain the gradual decline in wealth concentration during the interwar period. In any case the rentier class could not recover in a decade. Even if they had consumed no capital income between 1918 and 1927 and saved the full 4% flow returns, they could have compensated half their losses at most. Their children could only be much poorer than themselves.

Of course the rise of significant taxes worked against the reconstitution of the pre war equilibrium. All the computations presented in this paper are pre-tax. When we compare capitalized inherited wealth and current wealth, we ignore inheritance taxes and taxes on capital income flows. Before 1914, this is an acceptable approximation. Top estate tax rates were less than 5% until WWI, and before 1914 there was no income tax. However, top estate and income tax rates were abruptly raised in the early 1920s to levels above 30%. Most rentiers dying in 1922–1927 had inherited before the war and therefore did not have to pay much inheritance taxes on the bequests they received. However they did pay substantial income taxes on their capital income flow during the 1920s, and their successors had to pay significant estate taxes. In other words, in after-tax terms, the successors of top rentiers dying in 1922–1927 actually received much less than the pre-tax estimates reported on Fig. 7 (maybe half as much).

## 5. Conclusion

This paper has shown that the methodology and data one uses to evaluate the relative importance of life-long

accumulation of wealth versus inheritance are critical. Modigliani's approach generally understates the role of inheritance because it fails to recognize that inherited assets deliver positive flow returns. Although the Kotlikoff–Summers' method capitalizes observed bequests, it overstates the role of inherited wealth because it does not subtract from the stock of capitalized bequest the fraction of the cumulated return that was actually consumed by rentiers or by those who leave nothing at all. Our departure from the representative agent framework is both minimal and tractable (we move from one homogenous group to two groups: inheritors and savers), and it allows for a better understanding of the aggregate process of wealth accumulation.

We also have substantive findings about the share of inherited assets in total wealth. The results we obtain for Paris 1872–1927 surely do not hold for all countries and time periods. Yet we focus on Paris not just because its data are excellent, but also because it offers a spectacular illustration of what a rentier society looks like. There are good reasons to believe that the results would not be radically different in today's France or U.S., or in the past in many places. Paris will also prove to be an excellent laboratory for studying the massive decline in inequality that arose following the Great Depression. That is a problem we fully intend to tackle but which could not be addressed here for lack of space. As we note earlier, the world of the early twenty first century has more in common with the end of the nineteenth century than it does with the mid twentieth. Rich societies now enjoy the benefits of nearly seven decades of capital accumulation. This wealth stock likely has a major impact on the structure of wealth. We

hope our findings will stimulate more research on these issues.

In particular, Paris 1872–1927 had highly developed financial markets, so if it was a city of rentiers, it was not due to capital markets failure. Parisian's estates were more modern than one might think: they were highly diversified, and mostly composed of financial assets, with a relatively sophisticated mix of domestic and foreign equity, private and public bonds. One might well consider whether financial development facilitates the emergence of rentier societies, by raising the return to incumbent wealth holders (i.e. even low skill inheritors can have high returns to their inherited wealth). Of course, at the same time financial development benefits savers, since it also allows middle class agents starting off with limited wealth to borrow and acquire assets (See Hoffman et al., 2007). In any case, our findings suggest that the issues of rentiers societies and efficiency are largely disconnected.

### Appendix A. Supplementary data

Supplementary data to this article can be found online at <http://dx.doi.org/10.1016/j.eeh.2013.07.004>.

### References

- Annuaire Statistique de la France*. Imprimerie Nationale 1880–sqq.
- Annuaire statistique de la ville de Paris et des communes suburbaines de la Seine*. Masson editeurs, 1880.
- Atkinson, A., Harrison, A.J., 1978. *Distribution of Personal Wealth in Britain, 1923–1972*. Cambridge University Press.
- Top Incomes Over the Twentieth Century. In: Atkinson, A., Piketty, T. (Eds.), vol. 1. Oxford University Press.
- Top Incomes — A Global Perspective. In: Atkinson, A., Piketty, T. (Eds.), vol. 2. Oxford University Press.
- Atkinson, A., Piketty, T., Saez, E., 2011. Top incomes in the long run of history. *Journal of Economic Literature* (49), 3–71.
- Blinder, A., 1988. Comments on Modigliani and Kotlikoff–Summers. In: Kessler, D., Masson, A. (Eds.), *Modelling the Accumulation and Distribution of Wealth*. Oxford University Press, pp. 68–76.
- Cagetti, M., De Nardi, M., 2008. Wealth inequality: data and models. *Macroeconomic Dynamics* 12 (sup. S2), 285–313.
- Hautcoeur, P.-C., Le Bris, D., 2010. A challenge to triumphant optimists? A blue chips index for the Paris Stock Exchange, 1854–2007. *Financial History Review* 17 (2), 141–183.
- Hoffman, P., Postel-Vinay, G., Rosenthal, J.L., 2007. *Surviving Large Losses; Financial Crises, the Middle Class, and the Development of Capital Markets*. Harvard University Press.
- Kotlikoff, L., 1988. Intergenerational transfers and savings. *Journal of Economic Perspectives* 2 (2), 41–58.
- Kotlikoff, L., Summers, L., 1981. The role of intergenerational transfers in aggregate capital accumulation. *Journal of Political Economy* (89), 706–732.
- Kuznets, S., 1962. *Economic change*. Norton.
- Lampman, R.J., 1962. *The Share of Top Wealth-Holders in National Wealth 1922–1956*. Princeton University Press.
- Le Bris, D., 2011. *Les actions françaises depuis 1854: analyses et découvertes*. (Ph. D. Thesis) University of Orleans.
- Modigliani, F., 1986. Life cycle, individual thrift and the wealth of nations. *American Economic Review* 76 (3), 297–313.
- Modigliani, F., 1988. The role of intergenerational transfers and lifecycle savings in the accumulation of wealth. *Journal of Economic Perspectives* 2 (2), 15–40.
- Piketty, T., 2011. On the long run evolution of inheritance — France 1820–2050. *Quarterly Journal of Economics* 61 (3), 1071–1131.
- Piketty, T., Postel-Vinay, G., Rosenthal, J.L., 2006. Wealth concentration in a developing economy: Paris and France, 1807–1994. *American Economic Review* 96 (1), 236–256.
- Séailles, J., 1910. *La répartition des fortunes en France*, Editions Félix Alcan.
- Strutt, H.C., 1910. Notes on the distribution of estates in France and the United Kingdom. *Journal of the Royal Statistical Society* 73 (6), 634–644.